UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/593,246	07/17/2007	Juergen Frosien	ZIMR/0048	9935

26290 7590 06/02/2009

PATTERSON & SHERIDAN, L.L.P.
3040 POST OAK BOULEVARD
SUITE 1500
HOUSTON, TX 77056

EXAMINER	
LOGIE, MICHAEL J	
ART UNIT	PAPER NUMBER
2881	
MAIL DATE	DELIVERY MODE
06/02/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/593,246	FROSIEN, JUERGEN	
	Examiner	Art Unit	
	MICHAEL J. LOGIE	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *09/18/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 33 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 33 recites "repeating imaging steps several times to generate a set of focus series measurements" in lines 3-4 is vague and indefinite. There are no imaging steps recited in claim 25. Does this mean repeating illumination steps and if so it is unclear as to what is taking the measurements?

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-9, 11-19, 22-30 are rejected under 35 U.S.C. 102(b) as being anticipated by Kojima (US patent no. 6,441,384).

In regards to claim 1, Kojima teaches a charged particle beam device (fig. 10), comprising: an emitter for emitting charged particles (fig. 10, 8); an aperture arrangement (fig. 10, 15) with at least one aperture (fig. 10, 15a) for blocking a part of

the emitted charged particles (as seen in figure 10), whereby the aperture arrangement forms a multi- area sub-beam charged particle beam with a cross-section-area and a cross-section- circumference (figs. 11 and 12, 15a), whereby a ratio between the cross-section-circumference and the cross- section-area is increased by at least 15% as compared to the ratio between a cross- section-circumference and a cross-section-area of a circular beam with the same cross- section-area as the multi-area sub-beam charged particle beam (the ratio is increased as can be seen in figures 11 and 12 wherein the separate aperture segments 15a provide for a larger circumference wherein the area would remain the same, however the amount of increase cannot be distinguished since no parameter is given. However, it is reasonable to assume that an increase in the order of 15% or more is also present since all other technical features of the claimed device are present); and an objective lens (fig. 10, 3b) for focusing the multi-area sub-beam charged particle beam onto the same location within the focal plane (col. 12, lines 23-34).

In regards to claim 2, Kojima teaches whereby the ratio between the circumference of the cross-section and the cross-section-area is increased by at least 40% as compared to the ratio between the circumference of the cross- section and the cross-section-area of a circular beam with the same cross-section-area (the ratio is increased as can be seen in figures 11 and 12 wherein the separate aperture segments 15a provide for a larger circumference wherein the area would remain the same, however the amount of increase cannot be distinguished since no parameter is given.

However, it is reasonable to assume that an increase in the order of 40% or more is also present since all other technical features of the claimed device are present).

In regards to claim 3, Kojima teaches whereby the aperture arrangement with at least one aperture comprises at least two apertures (figs. 11 and 15, 15a), whereby the multi-area sub-beam charged particle beam is provided as at least two independent charged particle beams (best seen in figure 10, beam 1 going through apertures 15a to form two independent beams).

In regards to claims 4, 9, 17 and 18, Kojima teaches whereby the aperture arrangement with at least one aperture forms a multi-area sub-beam charged particle beam with cross-like shape (col. 11, lines 66-67 and col. 12, lines 1-4, since the shape, the size and spacing of the apertures can be changed to restrict the semi-angle of the beam as seen in figures 8, 11 and 12, it is reasonable to assume that the aperture arrangement with at least one aperture forms a multi-area sub-beam charged particle beam with cross-like shape because all other technical features of the claimed device are present).

In regards to claim 5, Kojima teaches a charged particle beam device (fig. 10), comprising: an emitter for emitting charged particles (fig. 10, 8); an aperture arrangement (fig. 10, 15) with at least one aperture (fig. 10, 15a) for blocking a part of the emitted charged particles (as seen in figure 10), whereby the aperture arrangement forms a multi- area sub-beam charged particle beam with a cross-like shape (col. 11, lines 66-67 and col. 12, lines 1-4, since the shape, the size and spacing of the apertures can be changed to restrict the semi-angle of the beam as seen in figures 8, 11 and 12, it

is reasonable to assume that the aperture arrangement with at least one aperture forms a multi-area sub-beam charged particle beam with cross-like shape because all other technical features of the claimed device are present); and an objective lens (fig. 10, 3b) for focusing the at least two independent charged particle beams onto the same location within the focal plane (col. 12, lines 23-34).

In regards to claim 6, Kojima teaches whereby the multi-area sub-beam charged particle beam is provided with a 4-fold symmetry around an optical axis of the device (as seen in figures 11 and 12).

In regards to claim 7, Kojima teaches whereby the aperture arrangement with at least one aperture comprises at least two apertures (figs 11 and 12, 15a), whereby the multi-area sub-beam charged particle beam is provided as at least two independent charged particle beams (best seen in figure 10, beam 1 going through apertures 15a to form two independent beams).

In regards to claim 8, Kojima teaches a charged particle beam device (fig. 10), comprising: an emitter for emitting charged particles (fig. 10, 8); an aperture arrangement (fig. 10, 15) with at least one aperture (fig. 10, 15a) for separating the emitted charged particles into at least two independent charged particle beams (best seen in figure 10, beam 1 going through apertures 15a to form two independent beams); and an objective lens (fig. 10, 3b) for focusing the at least two independent charged particle beams onto the same location within the focal plane (col. 12, lines 23-34).

In regards to claim 11, Kojima teaches whereby the at least two independent charged particle beams have a distance (D) with respect to each other (fig. 8, beams are separated by 15a) such that no interaction occurs between the at least two independent charged particle beams (fig. 8, note: arrows).

In regards to claim 12, Kojima teaches whereby the at least two independent charged particle beams have a distance (D) with respect to each other (fig. 8), whereby the distance has about the same dimension as the diameter of the at least two apertures (col. 11, lines 66-67 and col. 12, lines 1-4, since the shape, the size and spacing of the apertures can be changed as seen in figures 11 and 12, it is reasonable to assume that the distance has about the same dimension as the diameter of the at least two apertures because all other technical features of the claimed device are present).

In regards to claim 13, Kojima teaches whereby the at least two apertures are formed by a segmented annular aperture (fig. 11).

In regards to claim 14, Kojima teaches whereby the at least two apertures have an elongated shape with a long axis and short axis, whereby the long axis is arranged radially with respect to an optical axis of the charged particle beam device (col. 11, lines 66-67 and col. 12, lines 1-4, since the shape, the size and spacing of the apertures can be changed as seen in figures 11 and 12, it is reasonable to assume that the at least two apertures have an elongated shape with a long axis and short axis, whereby the long axis is arranged radially with respect to an optical axis of the charged particle beam device because all other technical features of the claimed device are present).

In regards to claim 15, Kojima teaches whereby the at least two apertures are arranged rotational-symmetrical to an optical axis of the charged particle beam device (figs. 11 and 12).

In regards to claim 16, Kojima teaches whereby the at least one aperture of the aperture arrangement has a 4-fold symmetry shape (figs. 11 and 12 have 4-fold symmetric shapes).

In regards to claim 19, Kojima teaches whereby the aperture arrangement comprises four apertures (col. 11, lines 66-67 and col. 12, lines 1-4).

In regards to claim 22, Kojima teaches whereby the aperture arrangement is positioned between a virtual source (fig. 10, 3a) and a charged particle beam lens positioned closest to the source (fig. 10, 3b).

In regards to claim 23, Kojima teaches whereby the aperture arrangement is integrated in an anode or in an extractor (col. 11, lines 31-35).

In regards to claim 24, Kojima teaches a control means for interaction optimizing the at least two independent charged particle beams (fig. 10, apertures 15a optimize each of the at least two independent charged particle beams by acting as a stop and thus separating each of the beams).

Claim 25 recites the method of independent claim 1 and thus is inherently taught in view of the same citations above in claim 1.

In regards to claim 26, Kojima teaches generating at least two independent charged particle beams (fig. 8, aperture 15a divides the beam generating 2 independent charged particle beams).

In regards to claim 27, Kojima teaches whereby the at least two independent charged particle beams are generated on a circle around an optical axis of the charged particle device (as seen in the aperture arrangement of figure 12).

In regards to claim 28, Kojima teaches whereby the at least two apertures are provided such that no significant interaction between the at least two independent charged particle beams occur (fig. 10, aperture plate 15 separates the beam by apertures 15a to be converged onto the substrate as discussed in col. 12, lines 23-34).

In regards to claim 29, Kojima teaches whereby the aperture arrangement is illuminated such that the at least one aperture is homogeneously illuminated (col. 11, lines 31-37, since the aperture can be placed anywhere along the optical axis, it is interpreted that it would be within the scope to be placed where it can be illuminated homogeneously).

In regards to claim 30, Kojima teaches interaction-optimizing each of the at least two independent charged particle beams (fig. 10, apertures 15a optimize each of the at least two independent charged particle beams by acting as a stop and thus separating each of the beams).

Claims 8, 25, 31 are rejected under 35 U.S.C. 102(b) as being anticipated by Adamec et al. (US patent no. 6,943,349).

In regards to claim 8, Adamec et al. teach a charged particle beam device (fig. 1), comprising: an emitter (fig. 1, 2) for emitting charged particles (fig. 1, 4); an aperture arrangement (fig. 1, 5) with at least one aperture (fig. 1, 5A, 5E) for separating the

emitted charged particles into at least two independent charged particle beams (fig. 1, 4A, 4E, col. 4, lines 40-44); and an objective lens (fig. 1, 10) for focusing the at least two independent charged particle beams onto the same location within the focal plane (col. 5, lines 11-15).

In regards to claim 25, Adamec et al. teach a method of operating a charged particle beam device (inherent in the device of figure 1), comprising the steps of: illuminating an aperture arrangement (fig. 1, 4, 5) with at least one aperture for blocking a part of the emitted charged particles (fig. 1, 5 blocks parts of beam 4), whereby the aperture arrangement forms a multi-area sub-beam charged particle beam with a cross-section-area and a cross-section-circumference (fig. 1, 4A, 4E, apertures that form the sub-beams are best seen fig. 4), whereby a ratio between the cross-section-circumference and the cross-section-area is increased by at least 15% as compared to the ratio between a cross-section-circumference and a cross-section-area of a circular beam with the same cross-section-area as the multi-area sub-beam charged particle beam (the ratio is increased as can be seen in figure 4 wherein the separate aperture segments provide for a larger circumference wherein the area would remain the same, however the amount of increase cannot be distinguished since no parameter is given. However, it is reasonable to assume that an increase in the order of 15% or more is also present since all other technical features of the claimed device are present); and focusing the multi-area sub-beam charged particle beam with an objective lens (fig. 1, 10) onto the same location of a specimen (col. 5, lines 11-15).

In regards to claim 31, Adamec teaches whereby the charged particles are energized to impinge on the specimen with an energy below 3 keV (col. 5, lines 23-26).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 10 rejected under 35 U.S.C. 103(a) as being unpatentable over Adamec et al. (US patent no. 6,943,349) as applied to claim 8 above, and further in view of Ishitani et al. (US patent no. 7,186,975).

In regards to claim 10, Adamec differs from the claimed invention by not disclosing whereby the emitter is a quasi spot-like emitter with a source diameter below 200 nm.

Ishitani et al. teaches whereby the emitter is a quasi spot-like emitter with a source diameter below 200 nm (col. 5, lines 58-67 and col. 6, lines 1-15).

Ishitani et al. modifies Adamec by providing an electron gun with small divergence.

Since both Adamec and Ishitani teach charged particle beam apparatus, it would be obvious to one of ordinary skill in the art to have the electron gun of Ishitani in the device of Adamec because it would provide improved effects of the annulation.

Claims 20-21 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adamec et al. (US patent no. 6,943,349) as applied to claim 8 above, and further in view of Matsuya et al. (US patent no. 6,924,488).

In regards to claims 20-21 and 32, Adamec differs from the claimed invention by not disclosing further comprising a spherical aberration correction element provided by an octopole element.

Matsuya et al. teach further comprising a spherical aberration correction element provided by an octopole element (fig. 12, "aberration correction C", note: col. 7, lines 36-47).

Matsuya et al. modify Adamec et al. by providing an octopole element for spherical aberration correction.

Since both Adamec and Matsuya teach charged particle beam devices, it would be obvious to one of ordinary skill in the art to have the octopole element of Matsuya in the device of Adamec because it would perform aberration correction stably and optimally and minimized the diameter of the charged particle beam (Matsuya col. 4, lines 55-59).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Pertinent prior art is closely related art that individually or in combination could be considered grounds for rejection. See references cited for a listing of the pertinent prior art found and the prior art found.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL J. LOGIE whose telephone number is (571)270-1616. The examiner can normally be reached on 8:00 to 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on 571-272-2293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. J. L./
Examiner, Art Unit 2881

/ROBERT KIM/
Supervisory Patent Examiner, Art Unit 2881